



Armed Forces College of Medicine AFCM

Neuroscience Module/ Prof Azza Kamal



The Cerebral Hemispheres

BY

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&

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Intended Learning Outcomes

By the end of this lecture , the student will be able to:

- 1. List** the layers of the cerebral cortex and the cells forming them.
- 2. Compare** between the structure of the sensory and motor cortex.
- 3. Name** the major sulci, gyri, poles & lobes of the cerebral hemispheres.



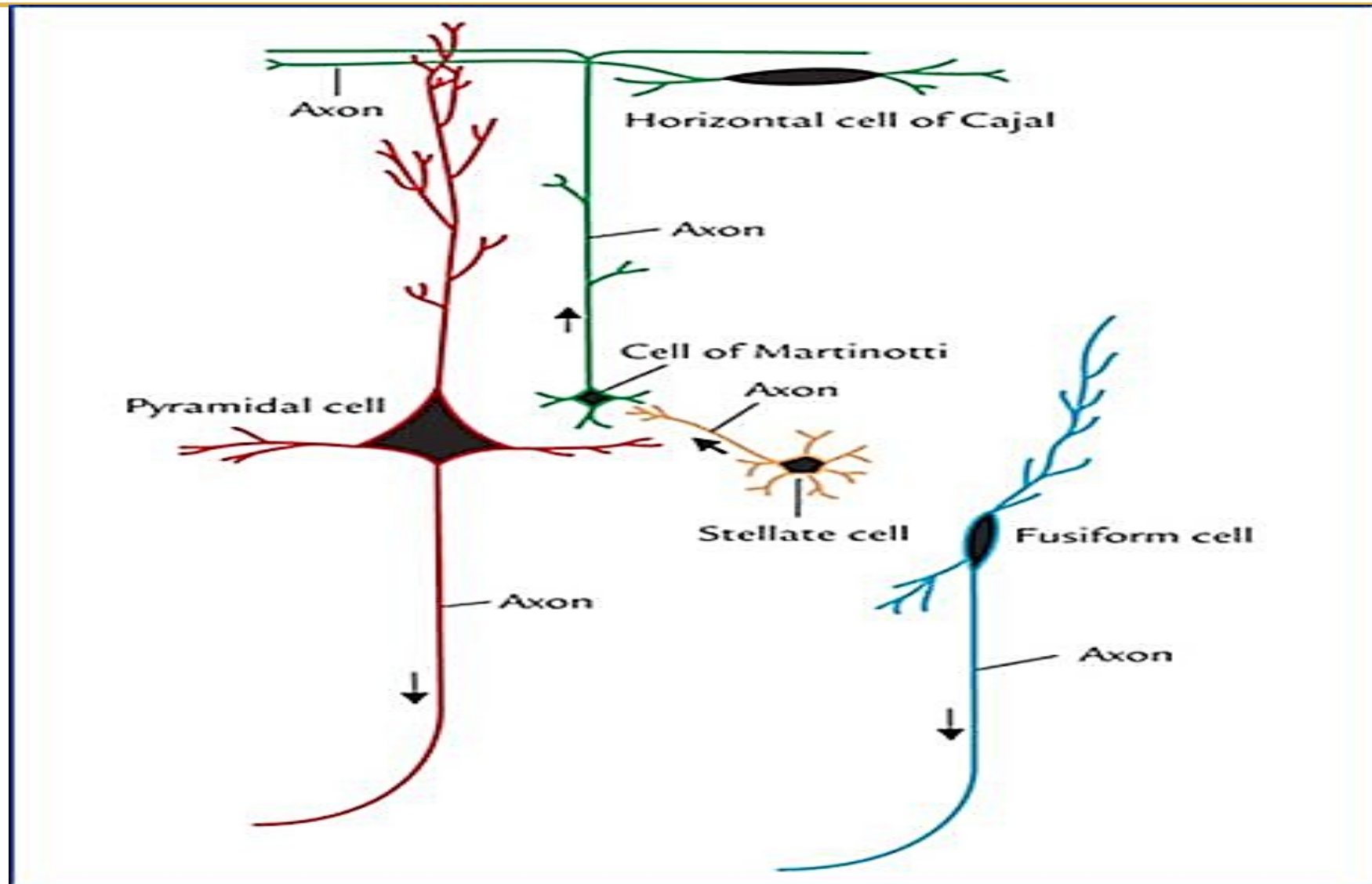
Layers of the cerebral cortex



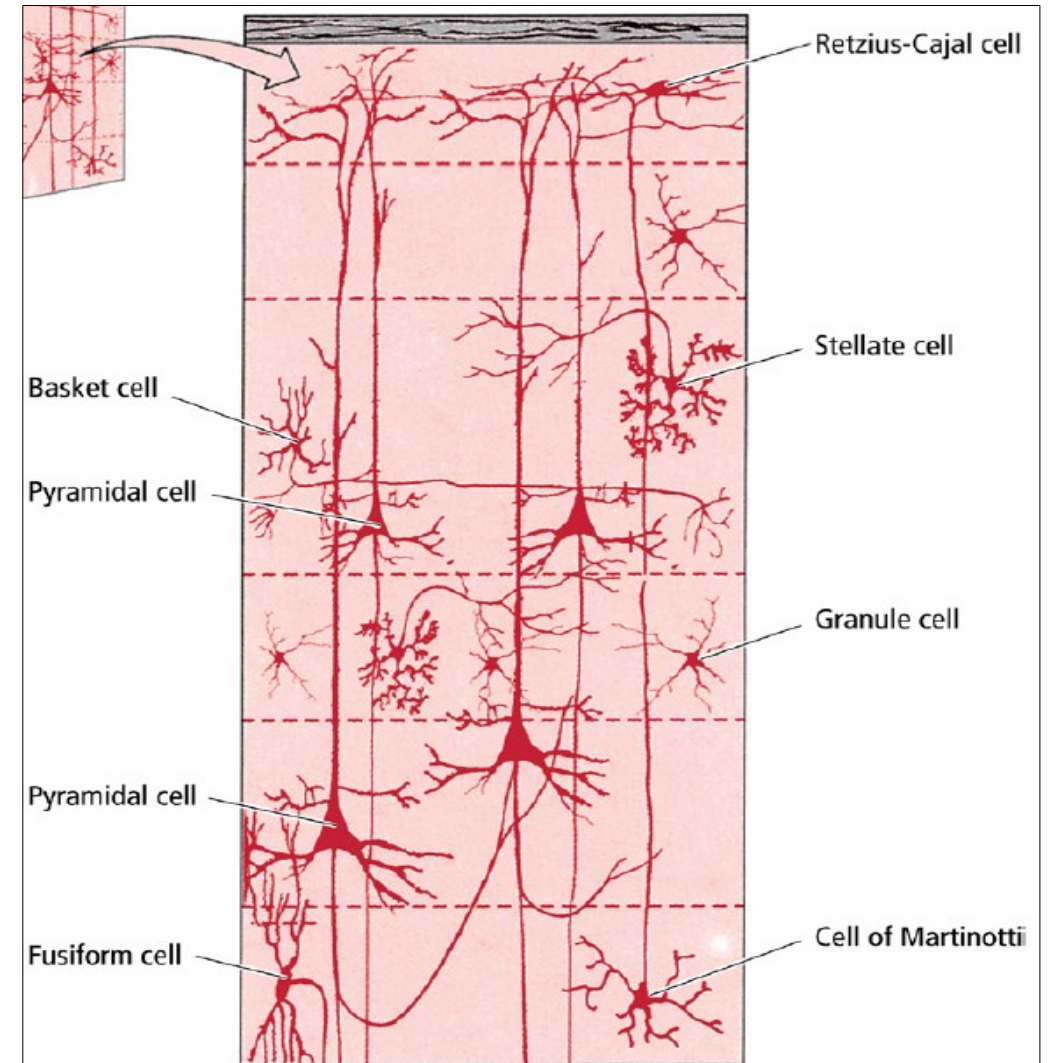
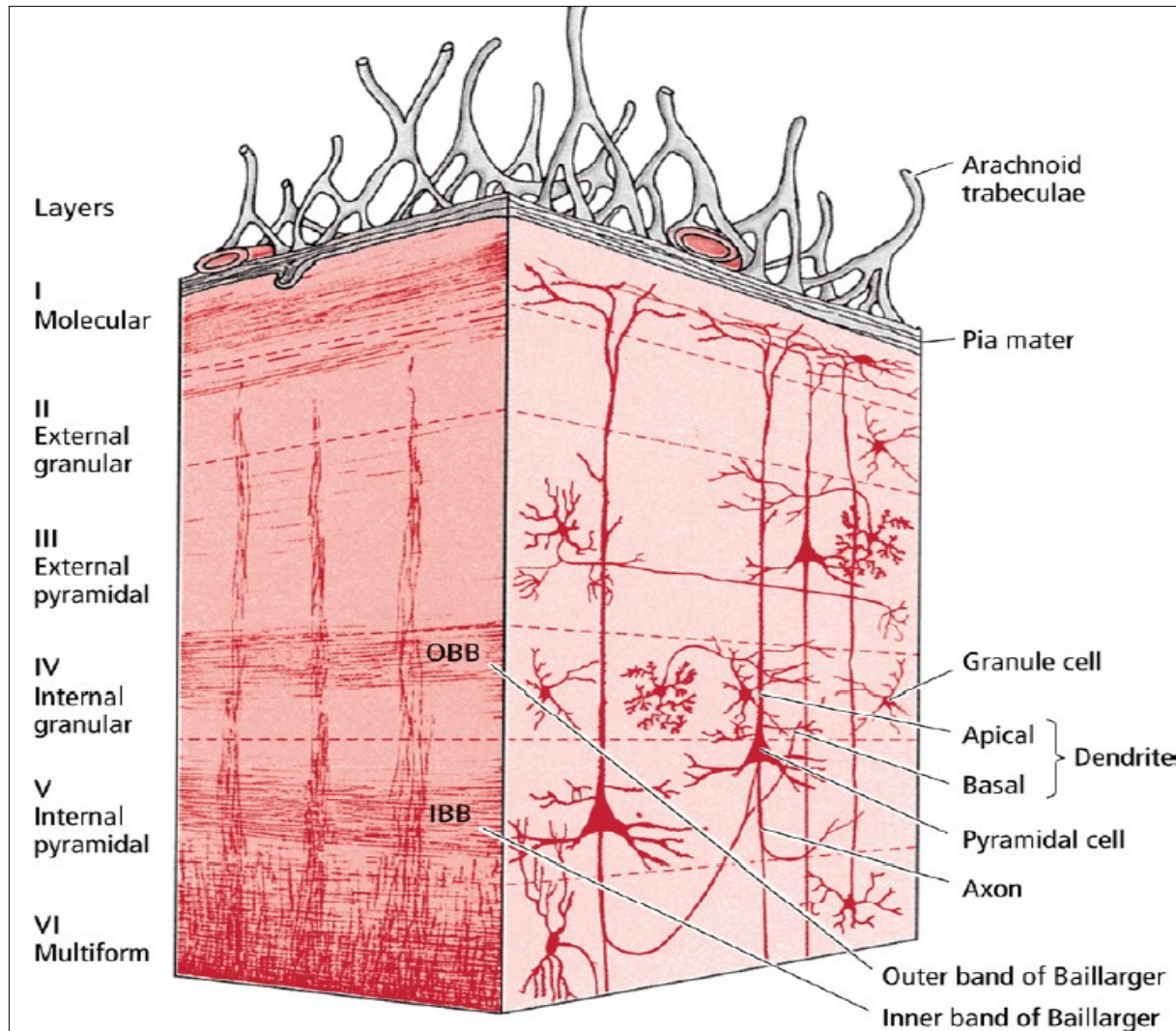
The Cerebral Cortex is formed of six (6) layers



Cells of the cerebral cortex



Layers of the cerebral cortex



Layers of the cerebral cortex



1) Molecular layer:

Most superficial layer.

Formed mainly of interlacing nerve fibers and cells of Cajal (absent in adult brain).

Nerve fibers include terminal dendrites of pyramidal and fusiform cells and axons of Martinotti cells

2) External granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer.
- Their axons descend to the deep cortical layers.



Layers of the cerebral cortex



3) External pyramidal layer:

- It contains superficial layer of small and medium sized pyramidal cells and deep layer of larger cells.
- Their dendrites pass to the first layer, while their axons enter the white matter.

4) Internal granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer
- Their axons descend to the deep cortical layers.
- It also contains the outer band of Baillarger.



Layers of the cerebral cortex



5) Internal pyramidal layer:

Formed of large and giant pyramidal cells.

- Their dendrites pass to the fourth layer
- Their axons project to enter the white matter as projection fibres. **In motor area 4 these cells called giant cells of Betz.**
- It also contains the internal band of Baillarger.

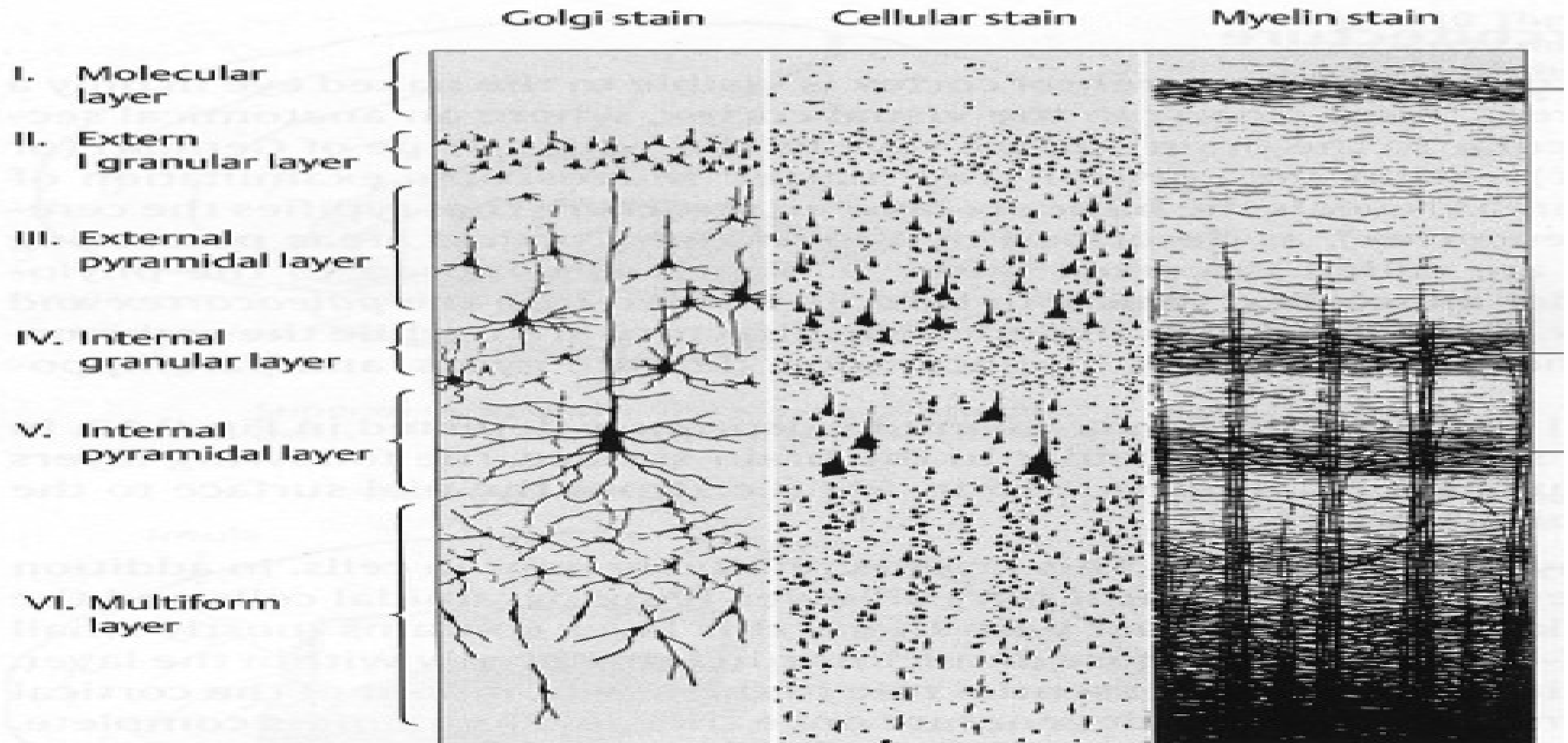
6) The mutiform layer:

It contains fusiform cells.

Their dendrites pass to the molecular layer

- Their axons enter the white matter as projection fibres.





http://www.learnneurosurgery.com/uploads/1/6/6/8/16689668/_8909191_orig.png



Differences between sensory and motor cortex

Motor cortex

- 1) It is the thickest zone in the whole cortex.
- 2) Large pyramidal cells are found in layers III and V , while giant pyramidal cells (Betz) are seen in the fifth layer.
- 3) Granule cells are rare or absent.

Sensory cortex

- 1) It is relatively thinner than motor cortex.
- 2) It contains closely packed granule cells.
- 3) Pyramidal cells are ill defined.



Quiz



1) Which of the following cells are not found in the cerebrum:

- a) Pyramidal cells.
- b) Purkinje cells.
- c) Granule cells.
- d) Fusiform cells.
- e) Cells of Martinotti

2) Giant cells of Betz are present in the following layer of the cerebral cortex :

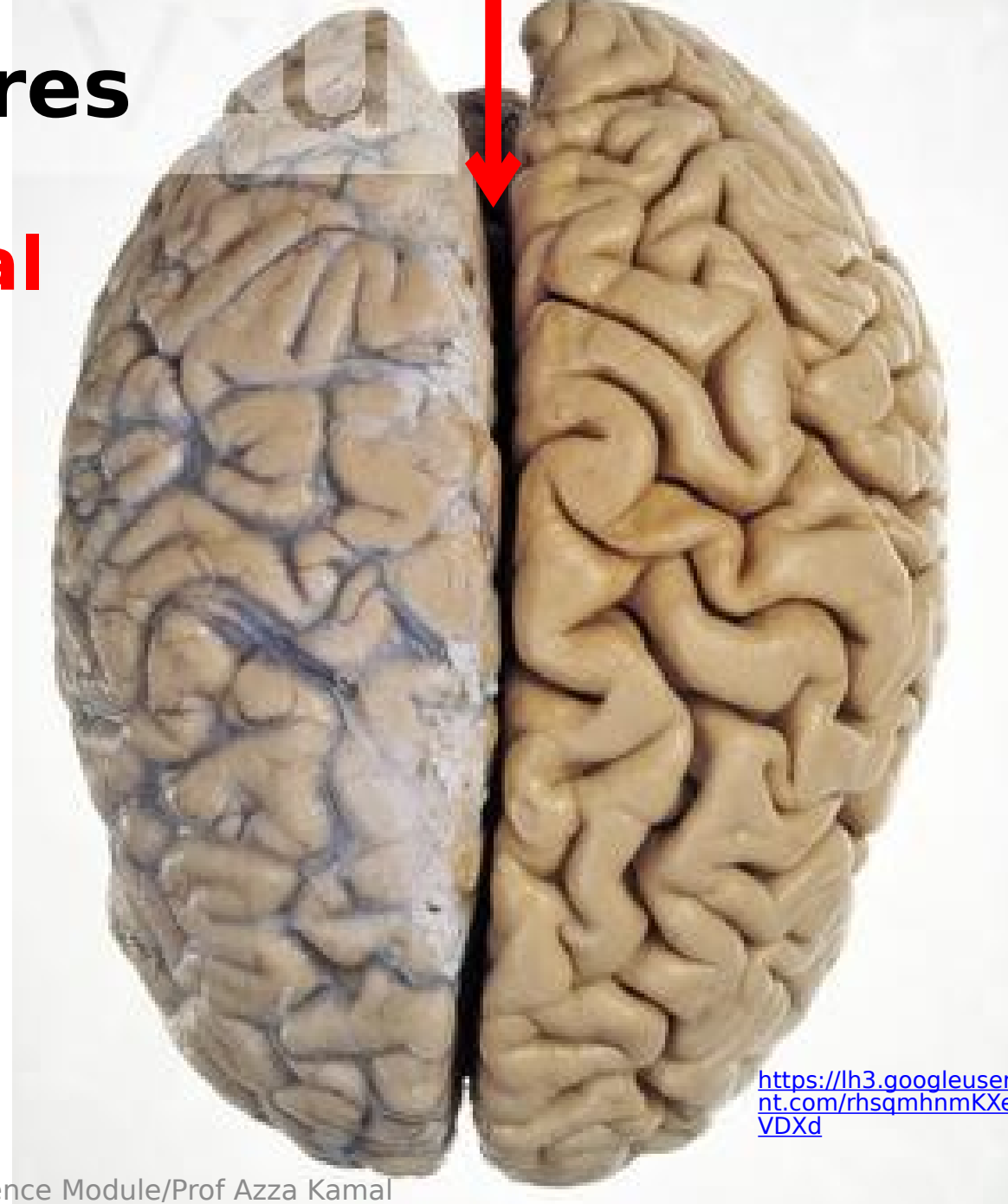
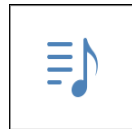
- a) Pleomorphic
- b) External granular
- c) Internal granular
- d) External pyramidal.
- e) Internal pyramidal.



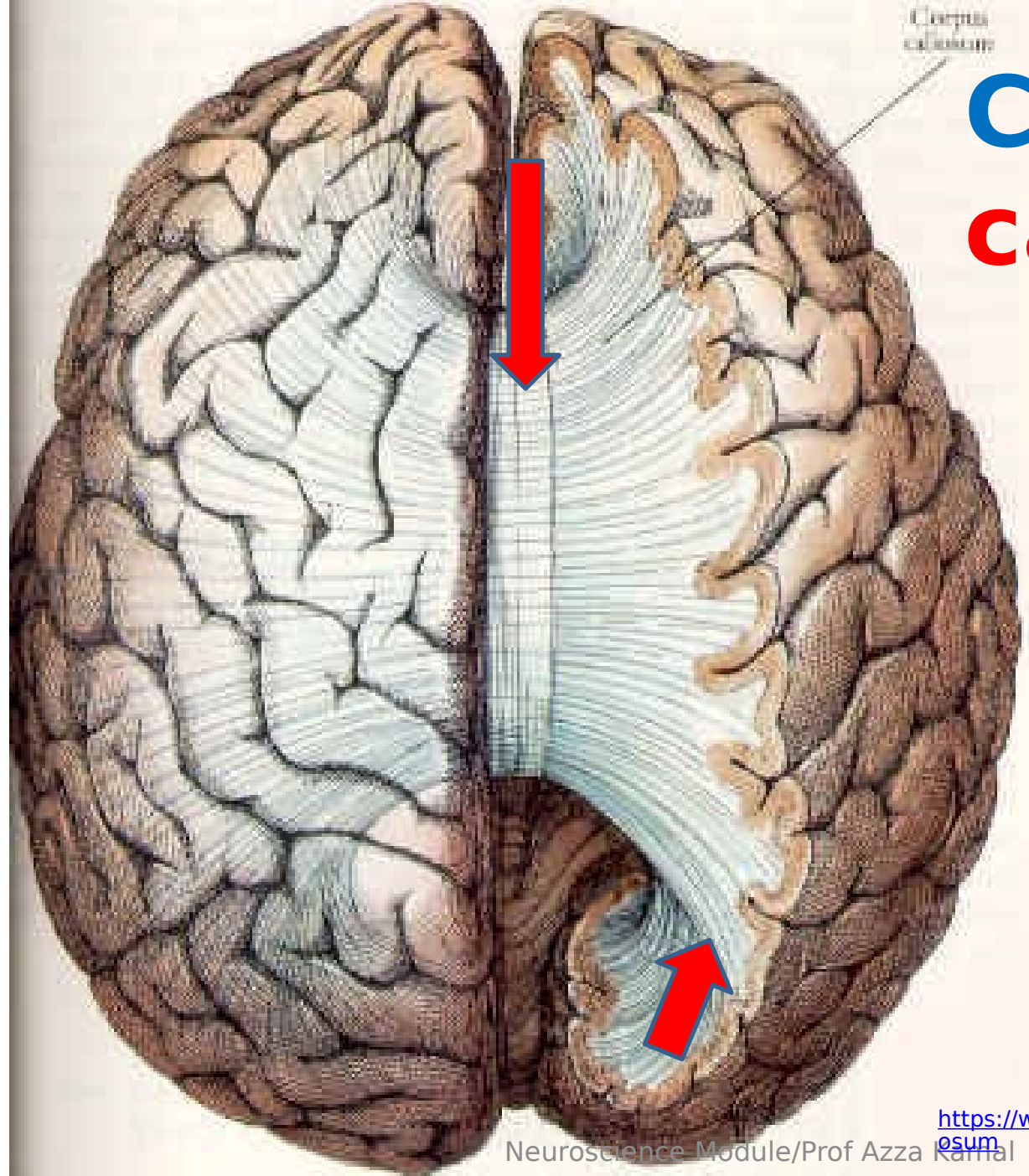
e cerebral hemispheres

**Longitudinal
fissure**

**Right & left
cerebral
hemispheres**



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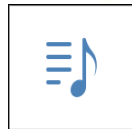
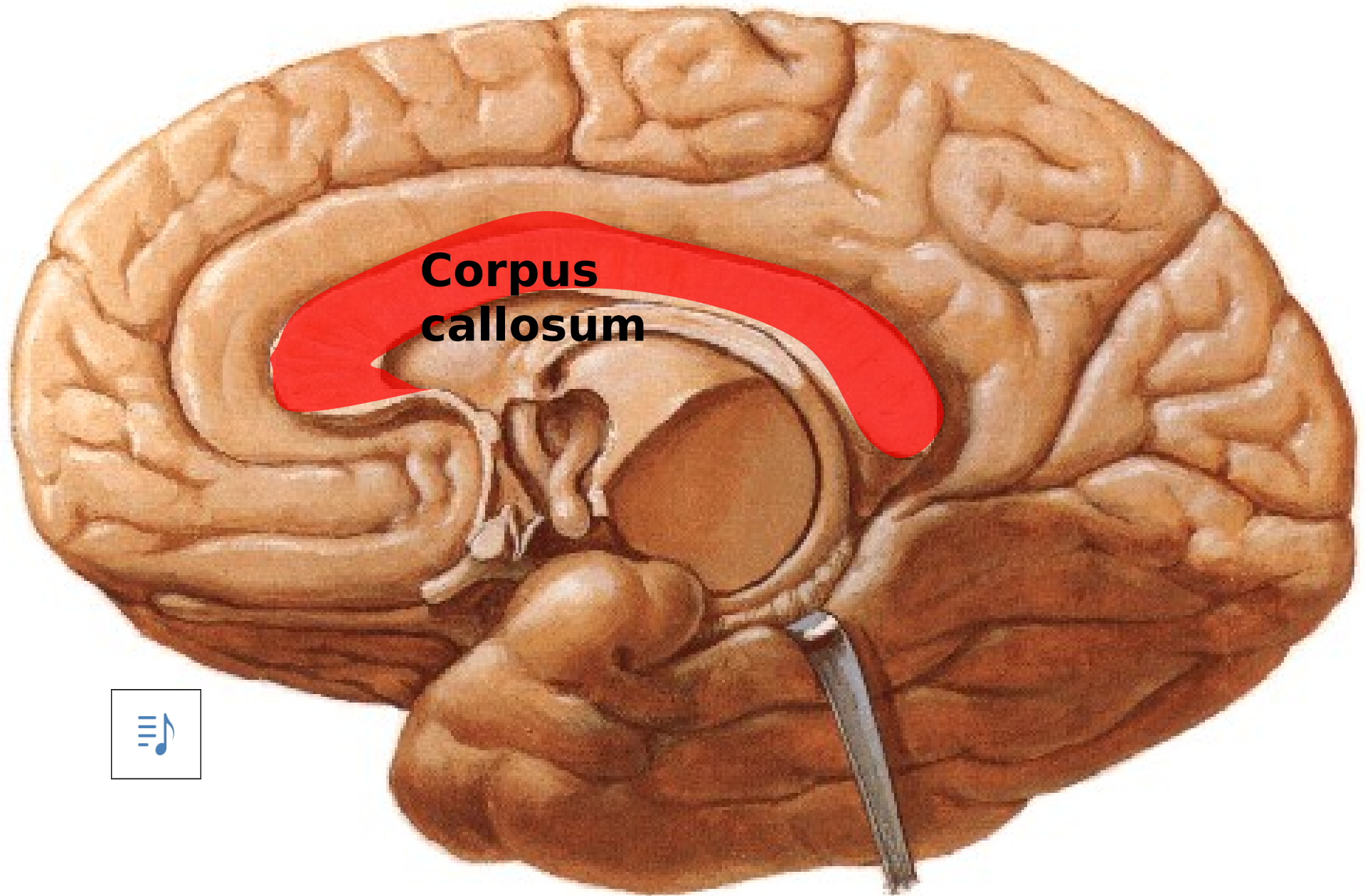


Corpus callosum



Commissural fibers which connect the right & left hemispheres

<https://www.google.com.eg/search?sa=G&hl=en-EG&q=corpus+callosum>





***Sulcu
s***

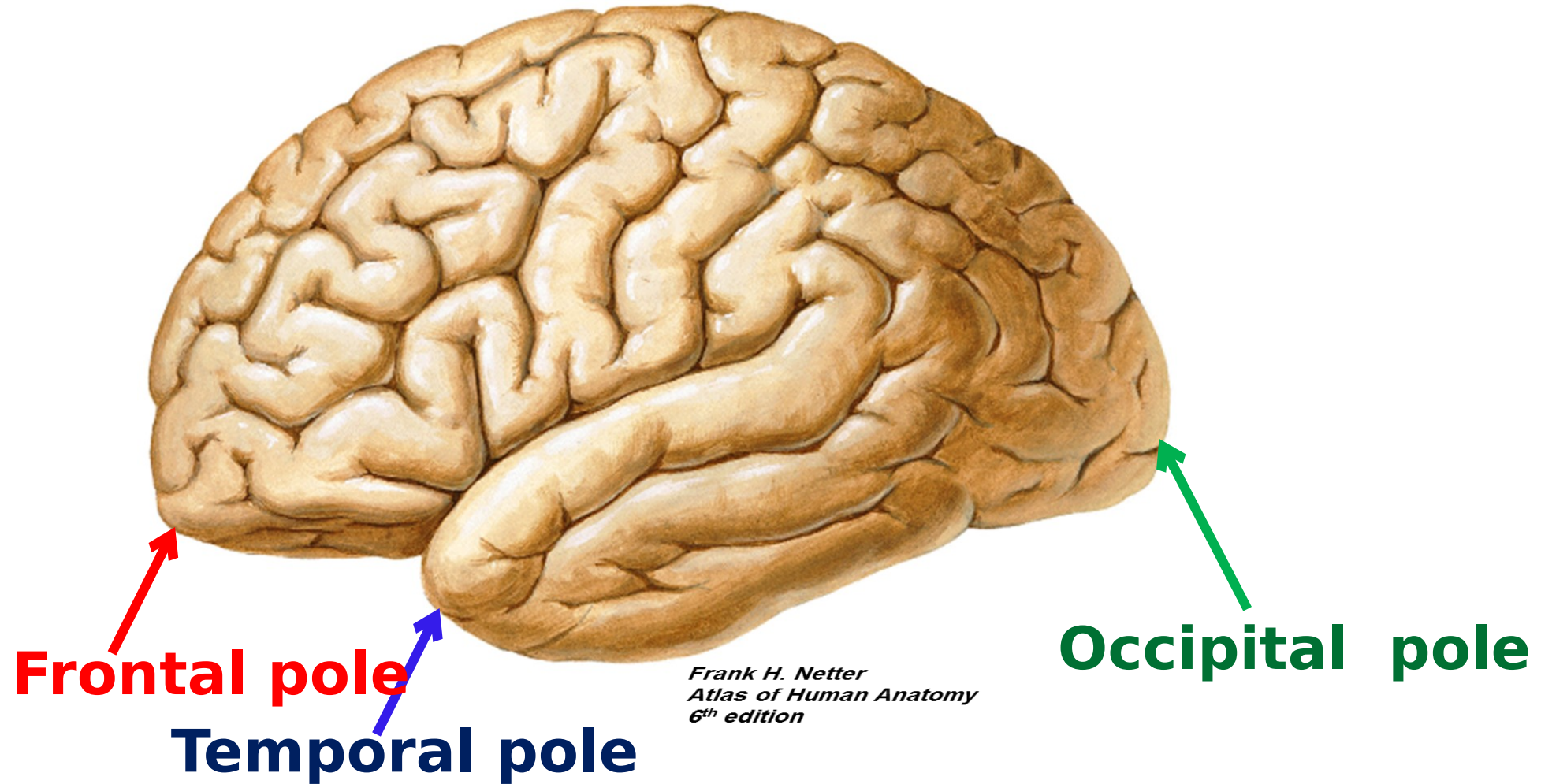
***Gyru
s***



<https://lh3.googleusercontent.com/AAMg>

Surface of cerebral hemisphere is composed of grey matter (cerebral cortex) that is thrown into grooves “Sulci” separated by folds “Gyri” to increase the surface area of

Each cerebral hemisphere has 3 poles

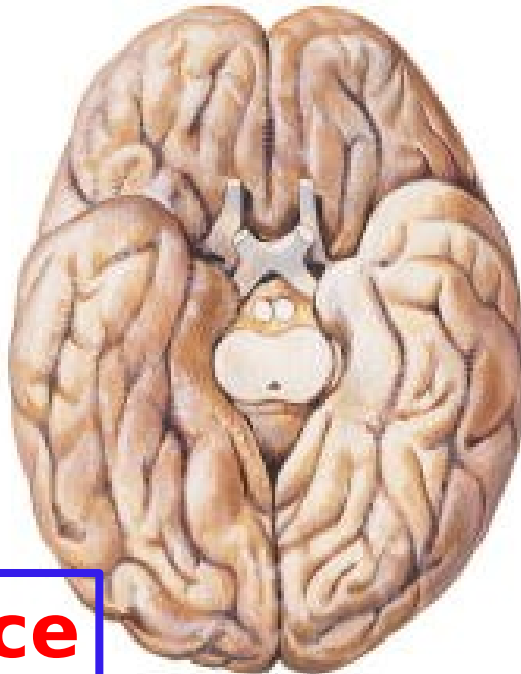


Each cerebral hemisphere has 3 surfaces

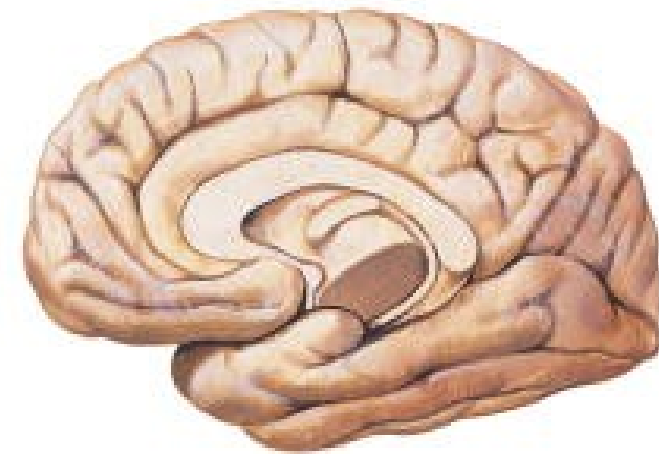


Lateral surface

*Frank H. Netter
Atlas of Human Anatomy
6th edition*



Inferior surface



Medial surface

Main sulci that help to divide the cerebral hemisphere into lobes:

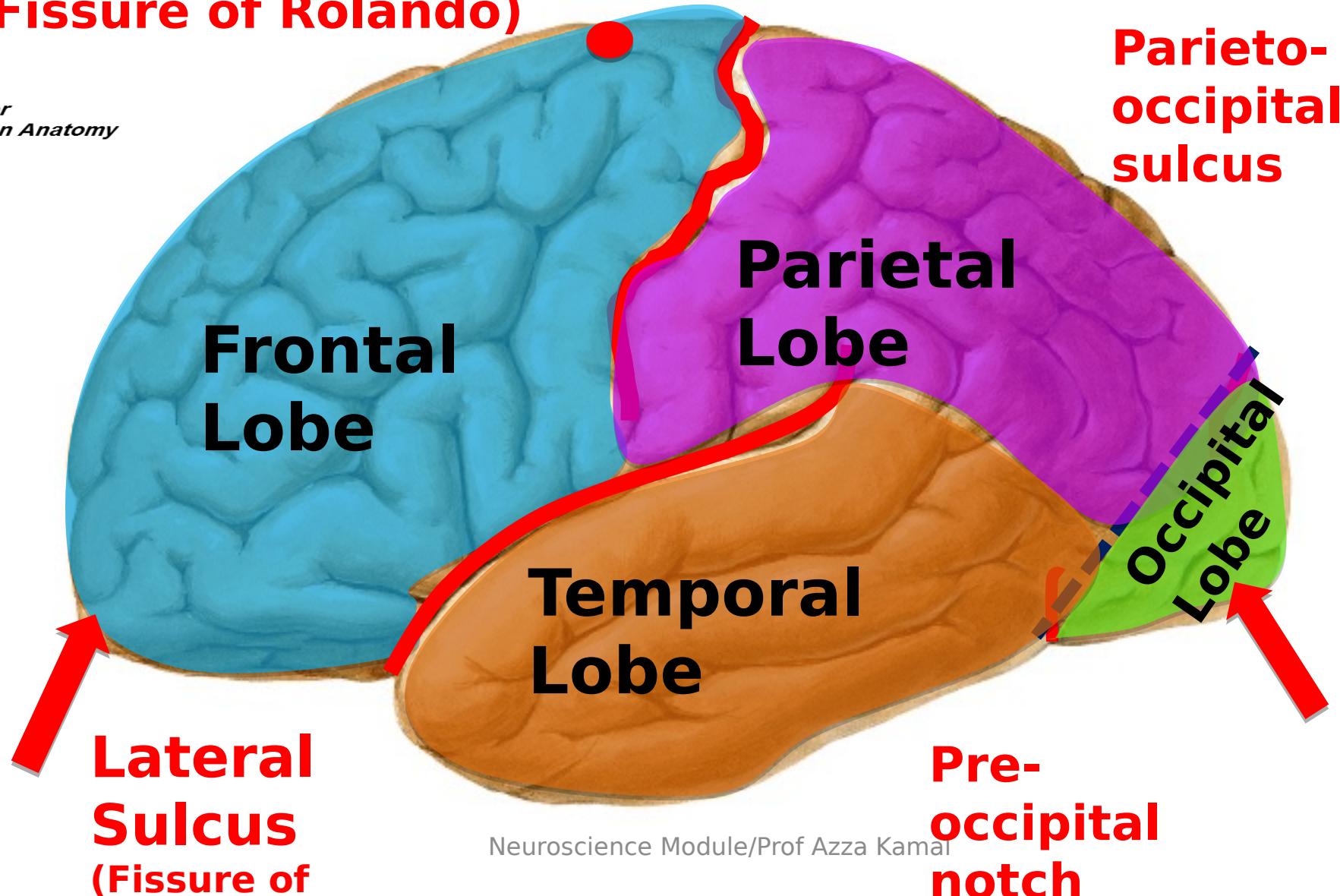


Central sulcus

(Fissure of Rolando)

One cm. behind midpoint between frontal & occipital poles

Frank H. Netter
Atlas of Human Anatomy
6th edition



Other sulci on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

Central sulcus

Precentral sulcus

Postcentral sulcus

**Intra-
parietal s**

**Lunate
sulcus**

Sup temporal s
Inf temporal s

*Frank H. Netter
Atlas of Human Anatomy
6th edition*



Gyri on lateral surface of cerebral hemisphere

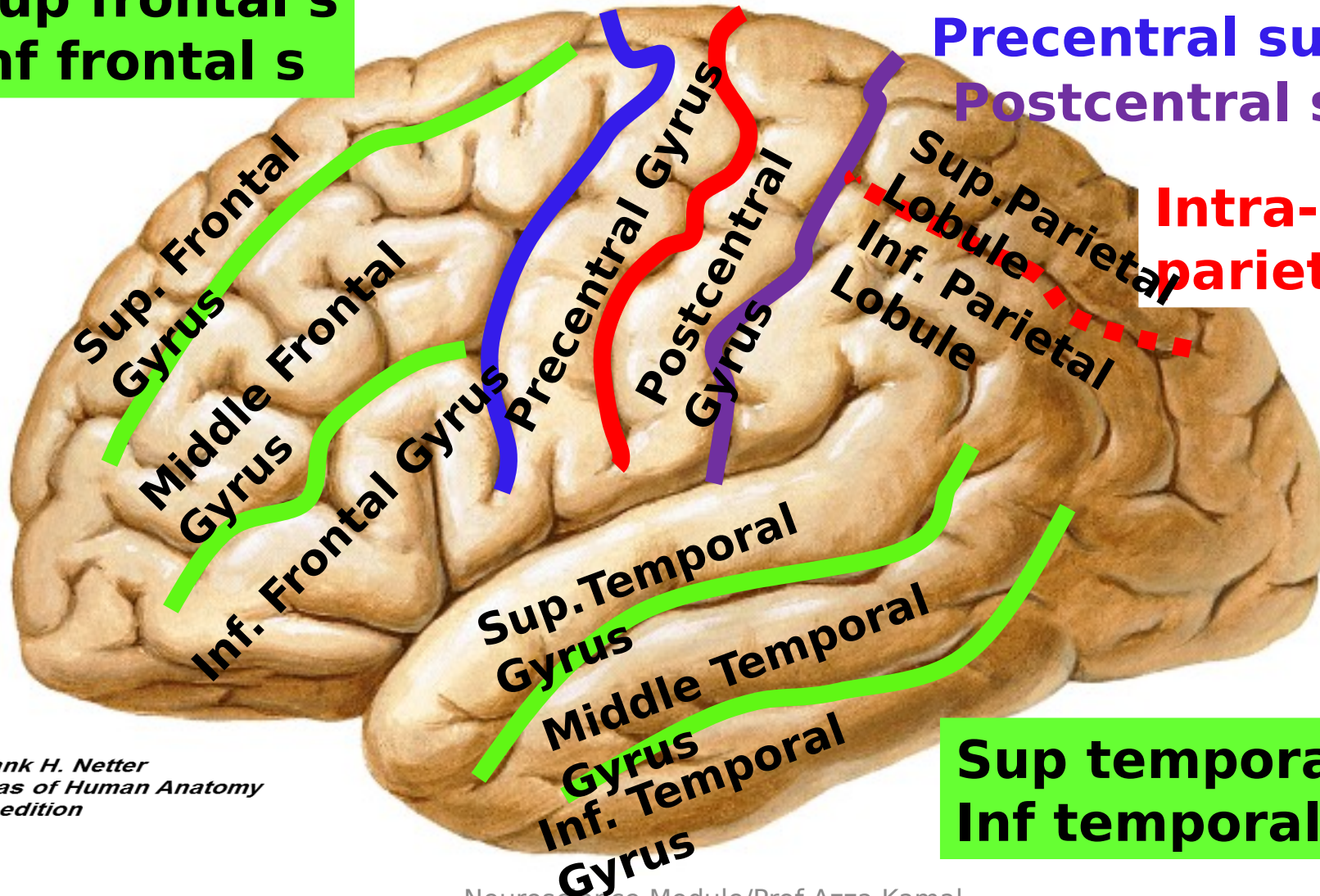
Sup frontal s
Inf frontal s

Central sulcus

Precentral sulcus

Postcentral sulcus

Intra-
parietal s

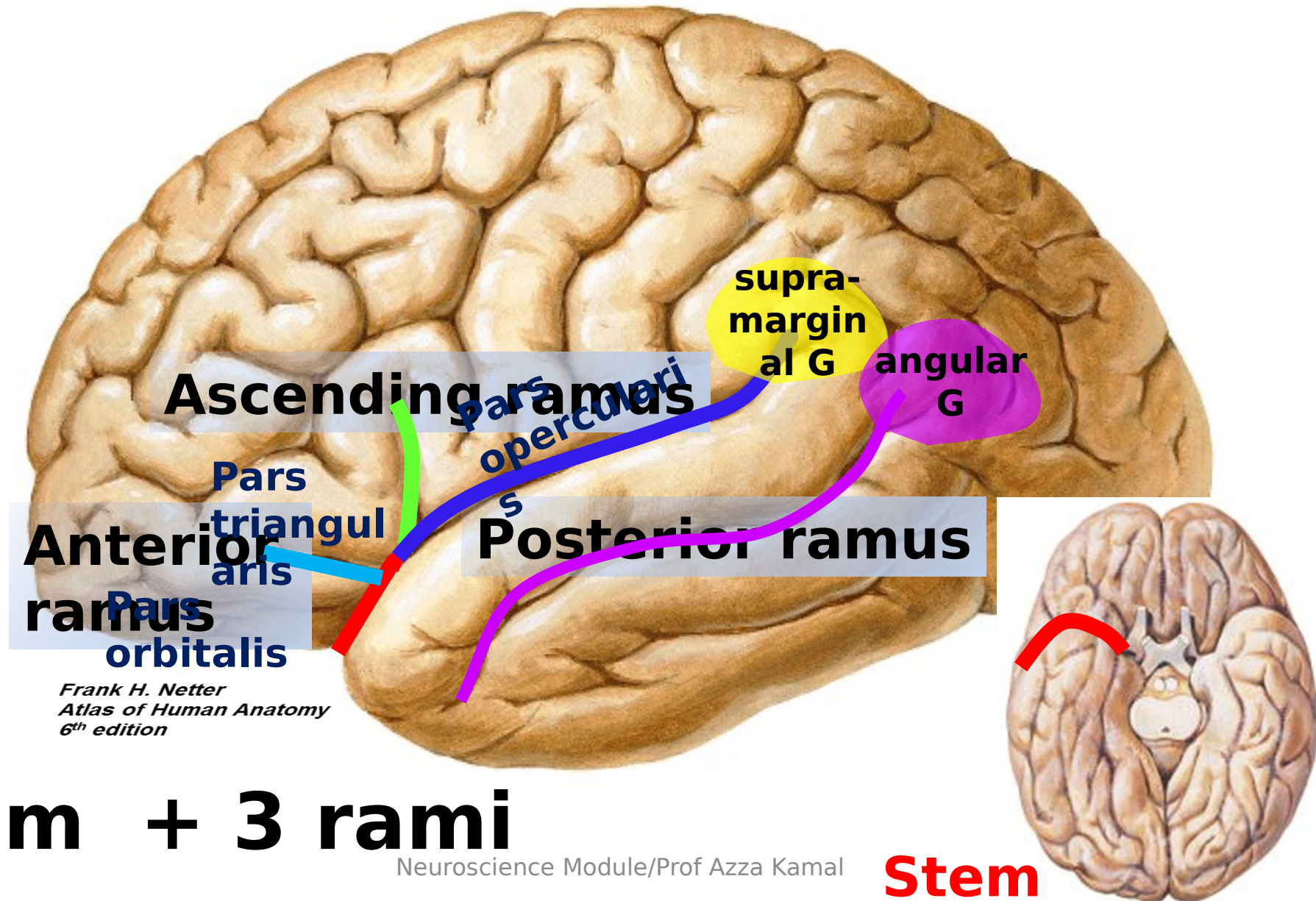


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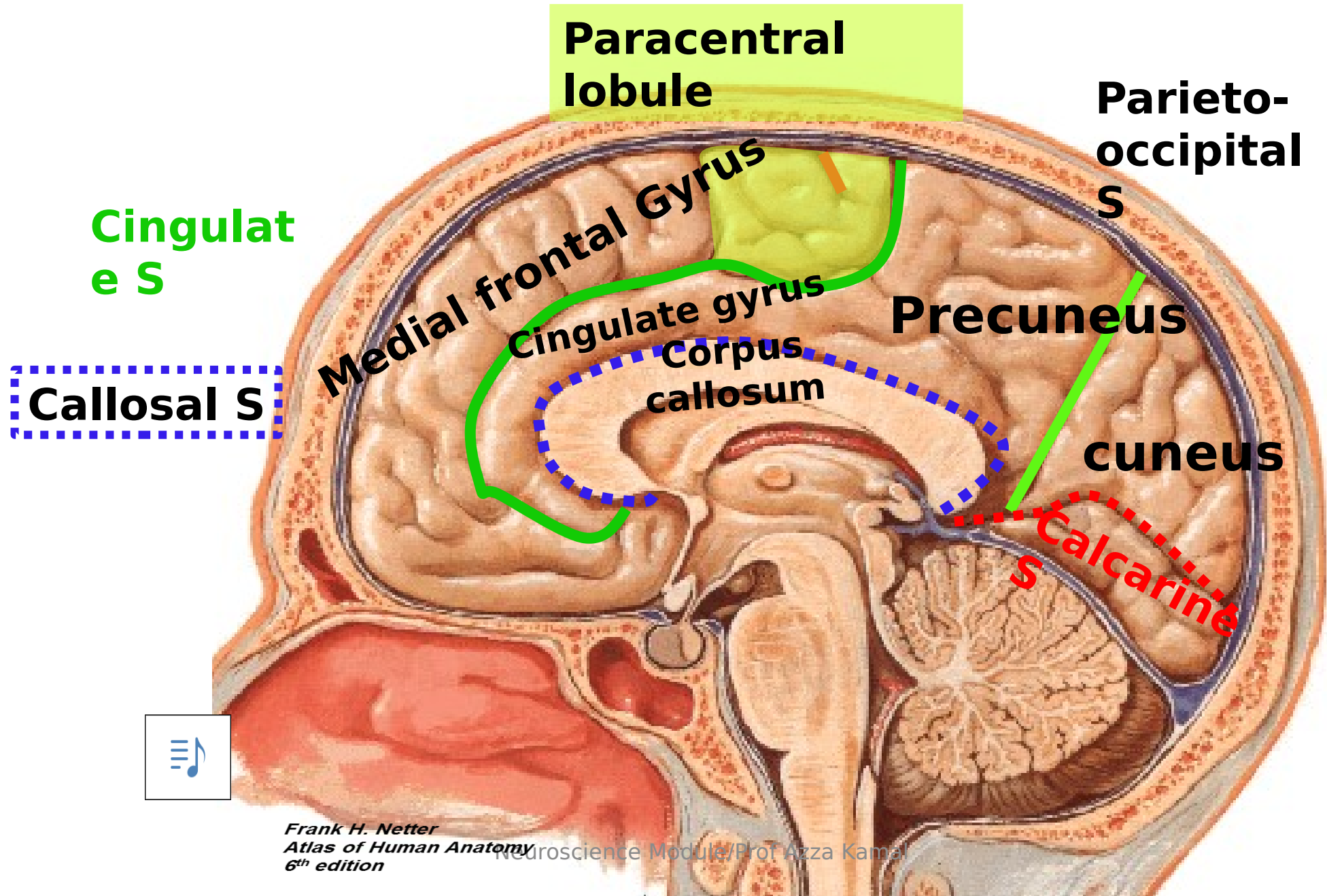
Sup temporal s
Inf temporal s

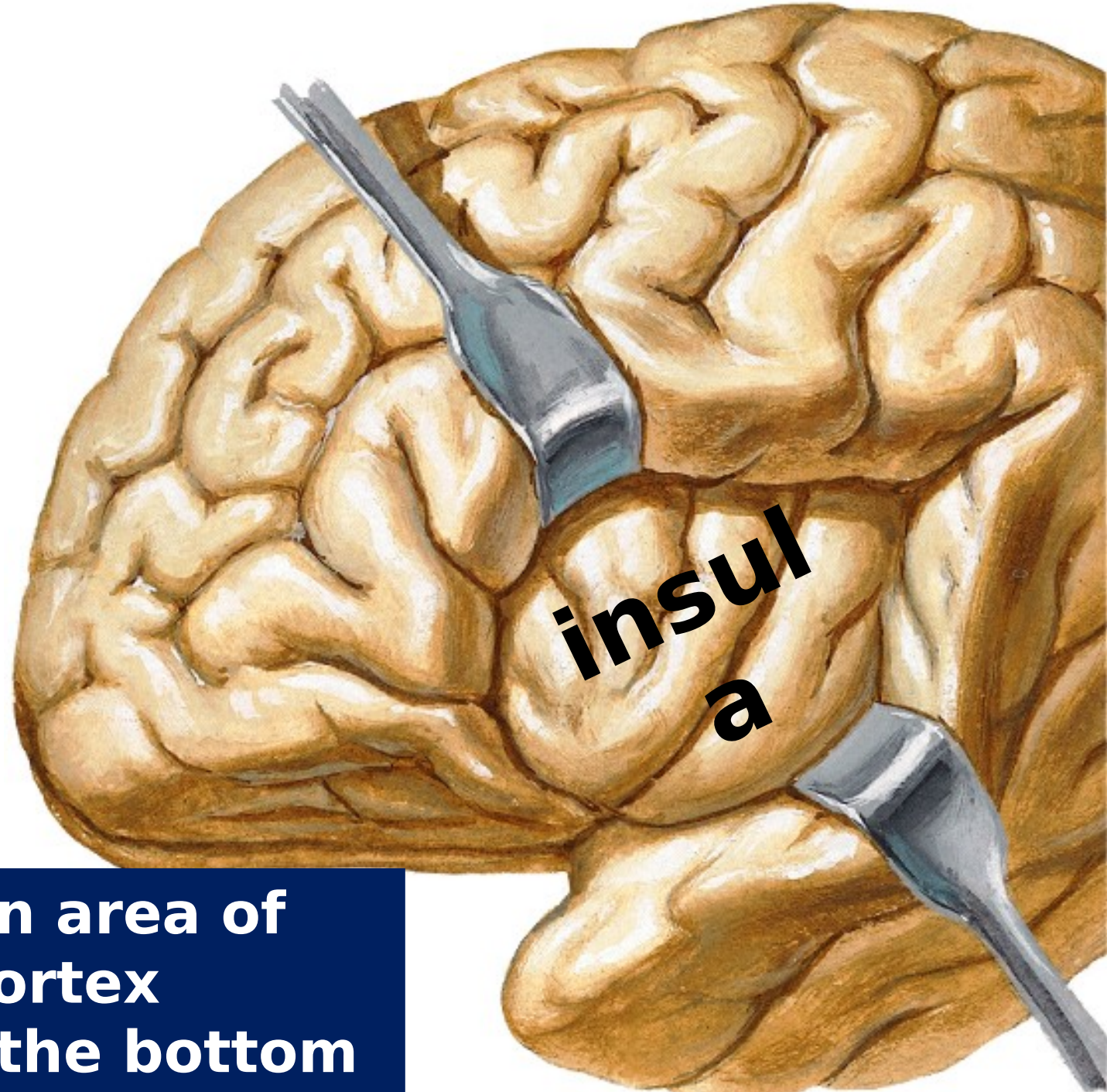


Lateral sulcus



Sulci & gyri on medial surface of cerebral hemisphere





*Frank H. Netter
Atlas of Human Anatomy
6th edition*

**Insula is an area of
cerebral cortex
hidden at the bottom**



**Circular
sulcus**

**Central
sulcus**

Insula (Island of Reil)

Function of insula:

1) Ant. Part □ Smell, taste & visceral sensation (autonomic)

2) Post. Part □ 2nd somatosensory area

*Frank H. Netter
Atlas of Human Anatomy
6th edition*

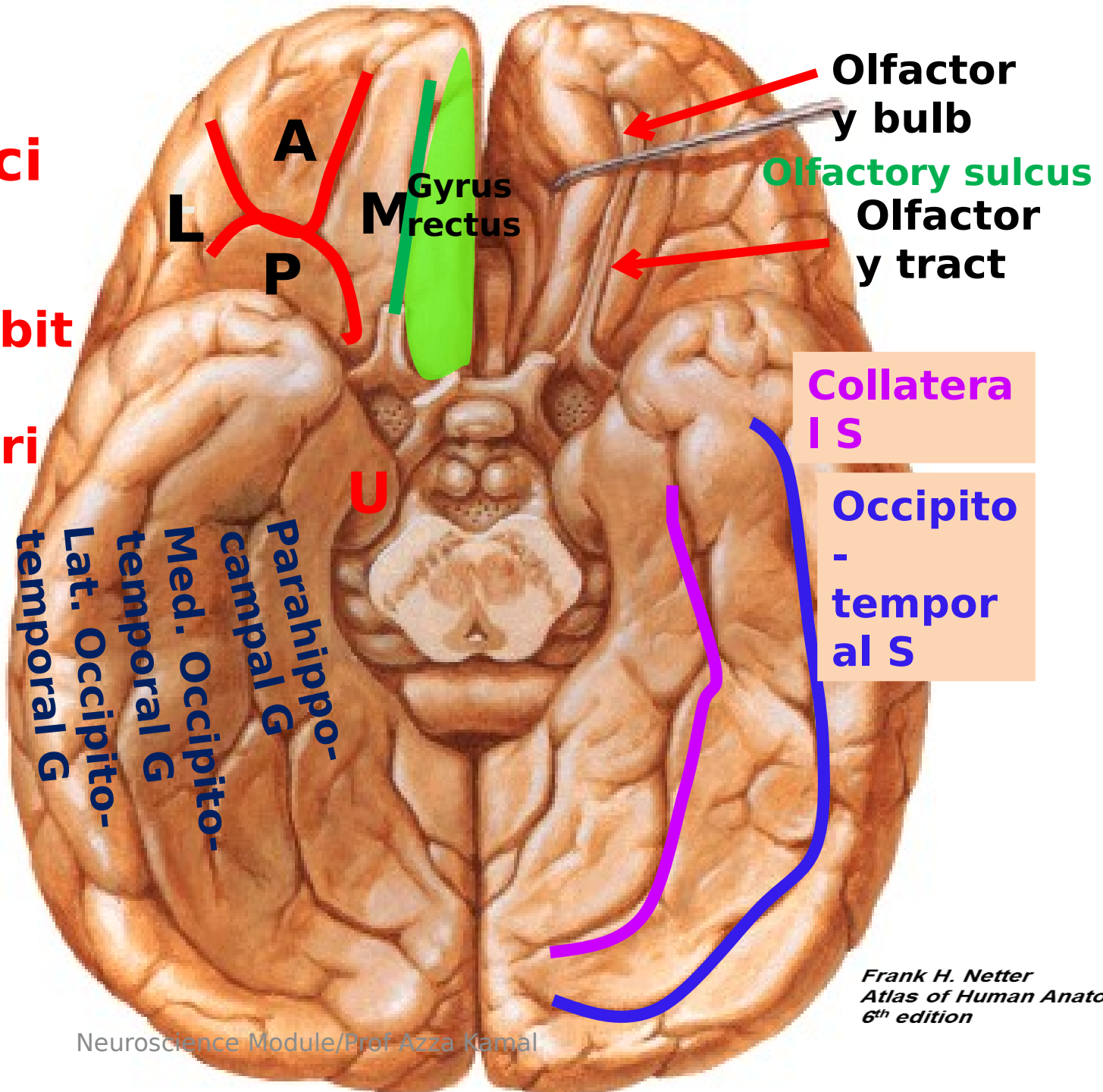
H- shaped orbital sulci

A □ anterior
P □ posterior
M □ medial
L □ lateral

Orbital gyri

U □ uncus

Sulci & Gyri on inferior



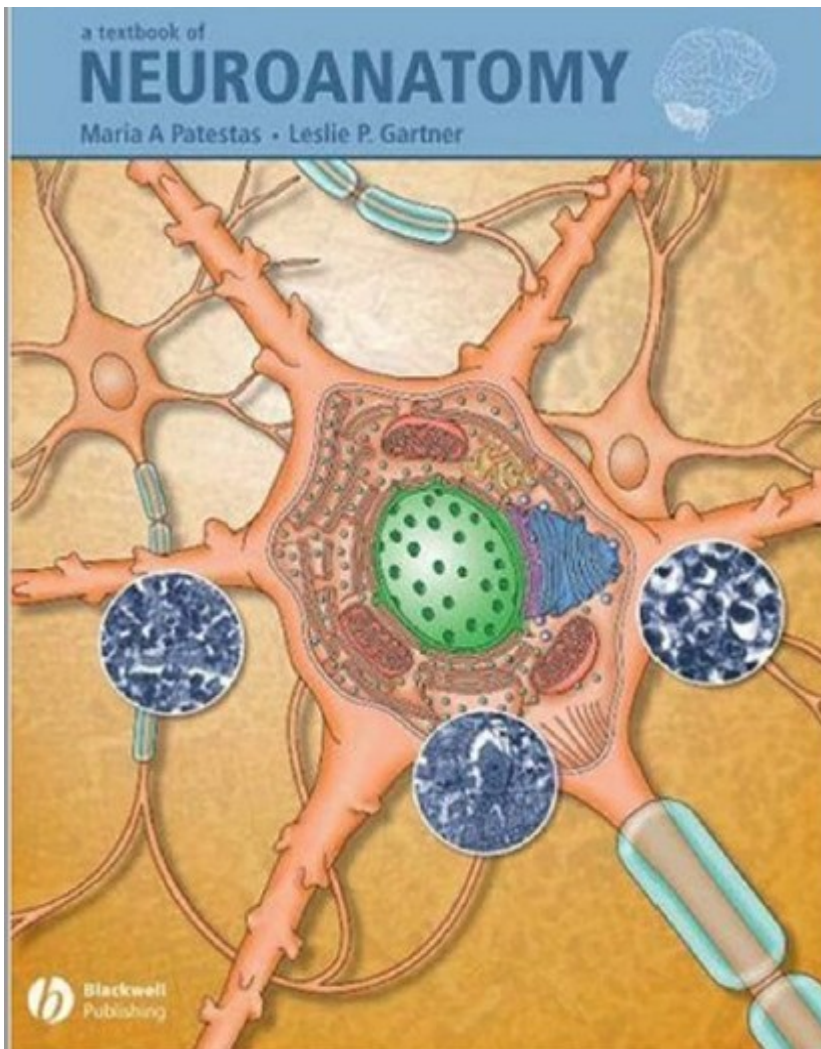
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Which of the following is an area of cerebral cortex hidden at the bottom of the lateral sulcus?

- A. Pars orbitalis
- B. Pars triangularis
- C. Pars opercularis
- D. Cuneus
- E. Insula

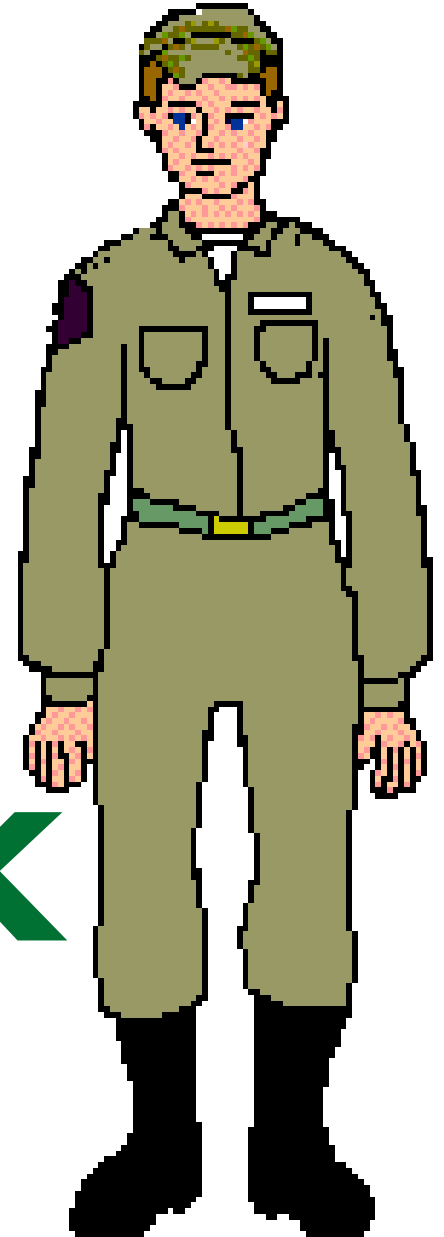




Reference:
Clinical Neuroanatomy, Richard Snell, 7th edition
Sulci & gyri : Pages 257-262



Thank You



Chapter 23: cerebral cortex . PP:402-405